

NISTTech

Fabrication Method of Topographically Modulated Microstructures using Pattern Homogenization with UV Light

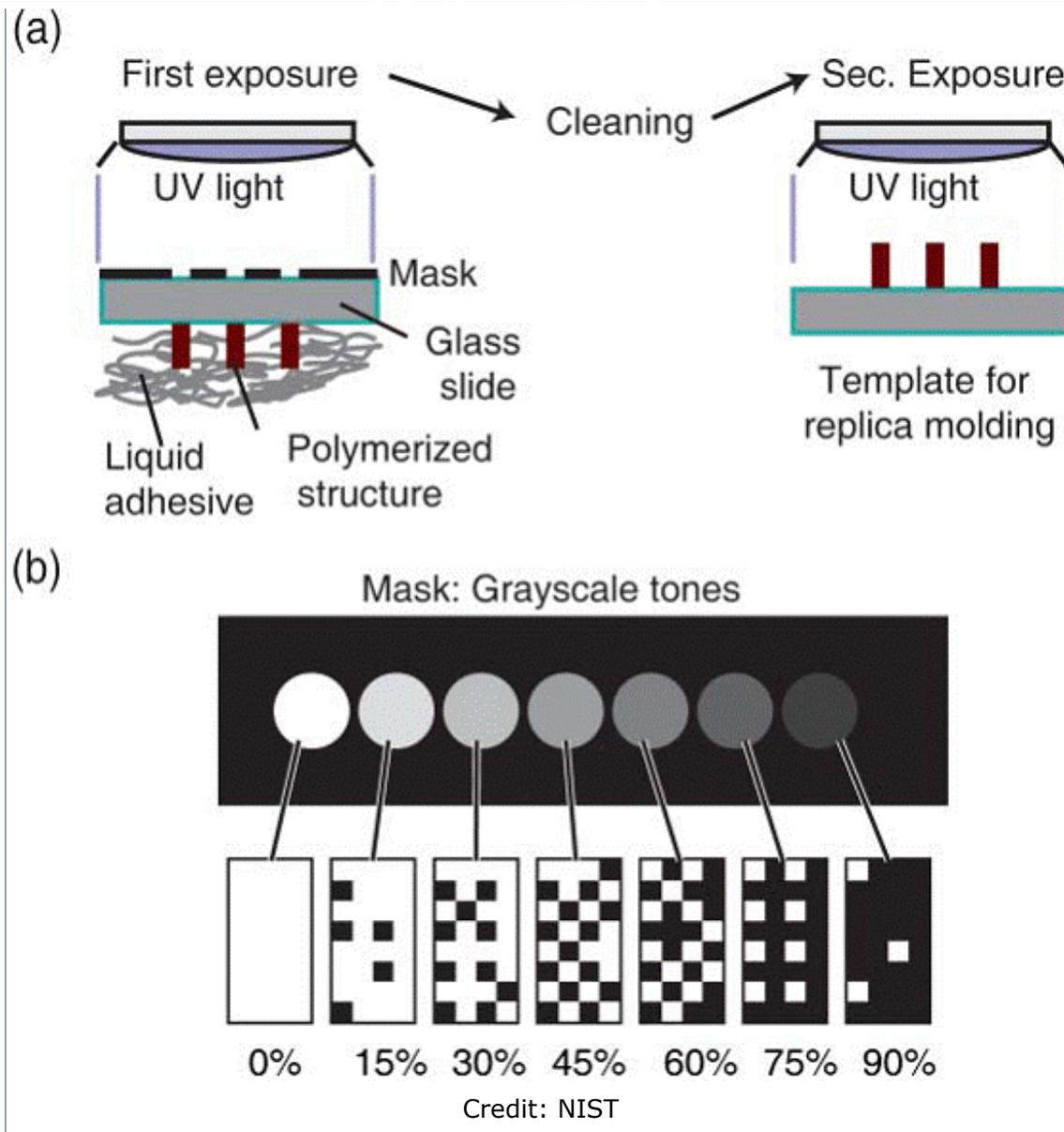
Low cost fabrication of 3-D microstructures with large areas

Description

The invention is a general method for low cost fabrication of chips containing three-dimensional microstructures having large areas and high resolution. A lithographic process creates smooth (homogeneous) surfaces by exposing a photopolymer to ultraviolet (UV) light passing through a special mask. The mask consists of arrays of opaque and transparent pixels whose size and geometric arrangement determines the microstructure pattern thus produced.

Images





Applications

- **Microfluidic device fabrication**
Biomedical ejectors for use in: drug and gene delivery systems; mass spectroscopy; and manufacture of multilayer parts and circuits

Advantages

- **3D fabrication**
Fabrication of new microfluidic and similar devices with complex three-dimensional microstructure geometries
- **Cost saving**
Low cost, ease of design and fast turn around times for mask design and fabrication

- **Greater flexibility**
Patterning of large areas (centimeters) and single structures simultaneously with topographic resolution less than 100 micrometers

Abstract

A method for microfabrication of a microfluidic device having sub-millimeter three dimensional relief structures is disclosed. In this method, homogeneous surfaces, which do not exhibit apparent pixel geometry, emerge from the interaction of the overlapping of diffracted light under opaque pixels and the nonlinear polymerization properties of the photoresist material. The method requires a single photolithographic step and allows for the fabrication of microstructures over large areas (centimeters) with topographic modulation of features smaller than 100 micrometers. The method generates topography that is useful in a broad range of microfluidic applications.

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Citations

1. J. Atencia, S. Barnes, J. Douglas, M. Meacham and L.E. Locascio. Using Pattern Homogenization of Binary Grayscale Masks to Fabricate Microfluidic Structures with 3D Topography. *Lab Chip*, vol 7, pp 1567-1573, 2007. DOI: 10.1039/b709369a.

References

- U.S. Patent Application #20090155728
- Docket: 07-014

Status of Availability

This invention is available for licensing.

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